

Scenario	Carbon		Nitrogen		Phosphorus	
	10 ⁶ lb/year	% Reduction	10 ⁶ lb/year	% Reduction	10 ⁶ lb/year	% Reduction
Baseline	78.4	-	21.2	-	2.49	-
2010 TMDL	78.5	0.1 ⁽¹⁾	13.0	38.7	1.61	35.3
DO Attainment	78.5	0.1 ⁽¹⁾	15.4	27.4	1.51	39.4
2009 Progress	78.5	0.1 ⁽¹⁾	15.1	28.8	1.75	29.7
HRSD	78.7	0.4 ⁽¹⁾	20.6	2.8	2.53	1.6 ⁽¹⁾

(1) % increase from baseline

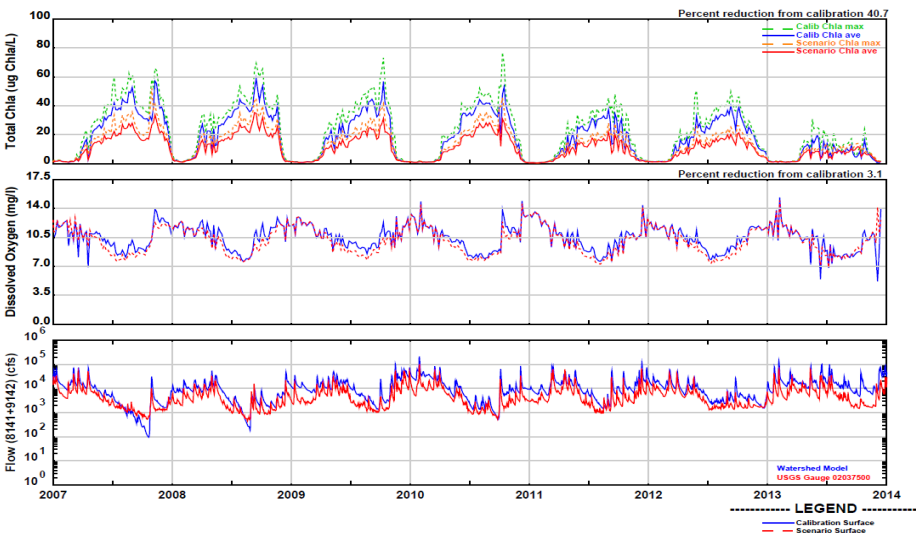


Figure 4-5a. James River 2010 TMDL Scenario results for station TF5.5

JAMES RIVER ESTUARY HAB CALIBRATION

Jim Fitzpatrick
Nataliya Kogan



Performed four scenario runs for the 2007-2013 period

- 2010 TMDL: the nutrient load reductions required to meet Chlorophyll-a criteria in the James River
- Chesapeake Bay DO Attainment: the nutrient load allocation/reductions in the James River watershed required to meet DO criteria in the Chesapeake Bay
- 2009 Progress TMDL Scenario: similar to the 2010 TMDL, but based on nutrient and sediment load reductions estimated to be realized considering 2009 land uses, NPS loadings, animal numbers, atmospheric deposition, point source loads and BMPs
- HRSD WWTP Scenario: nutrient load reductions, as part of the HRSD watershed general permit load reduction, and agreed to by HRSD as part of the state of Virginia's WIP

Scenario	Carbon		Nitrogen		Phosphorus	
	10 ⁶ lb/year	% Reduction	10 ⁶ lb/year	% Reduction	10 ⁶ lb/year	% Reduction
Baseline	78.4	-	21.2	-	2.49	-
2010 TMDL	78.5	0.1 ⁽¹⁾	13.0	38.7	1.61	35.3
DO Attainment	78.5	0.1 ⁽¹⁾	15.4	27.4	1.51	39.4
2009 Progress	78.5	0.1 ⁽¹⁾	15.1	28.8	1.75	29.7
HRSD	78.7	0.4 ⁽¹⁾	20.6	2.8	2.53	1.6 ⁽¹⁾

(1) % increase from baseline

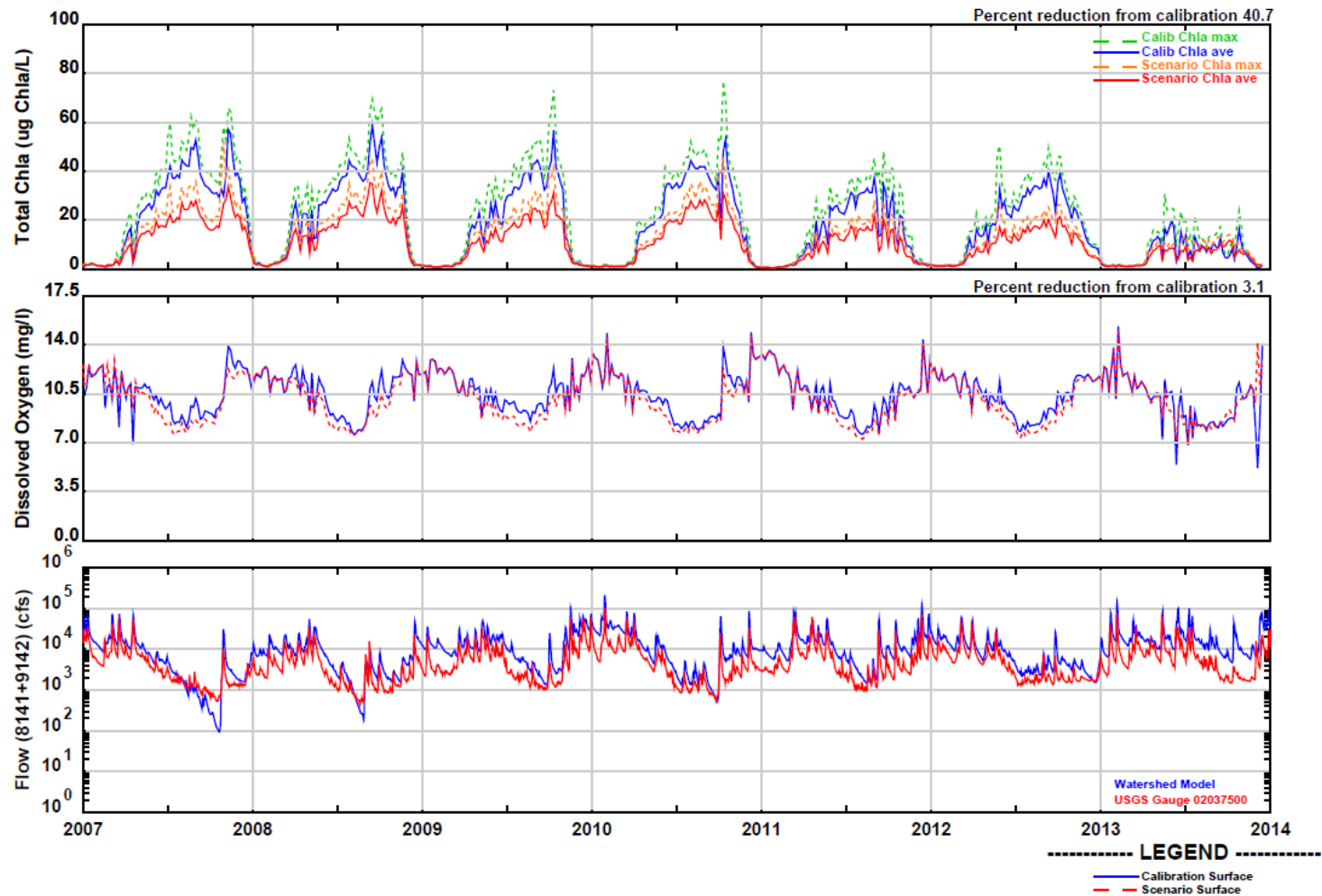


Figure 4-5a. James River 2010 TMDL Scenario results for station TF5.5

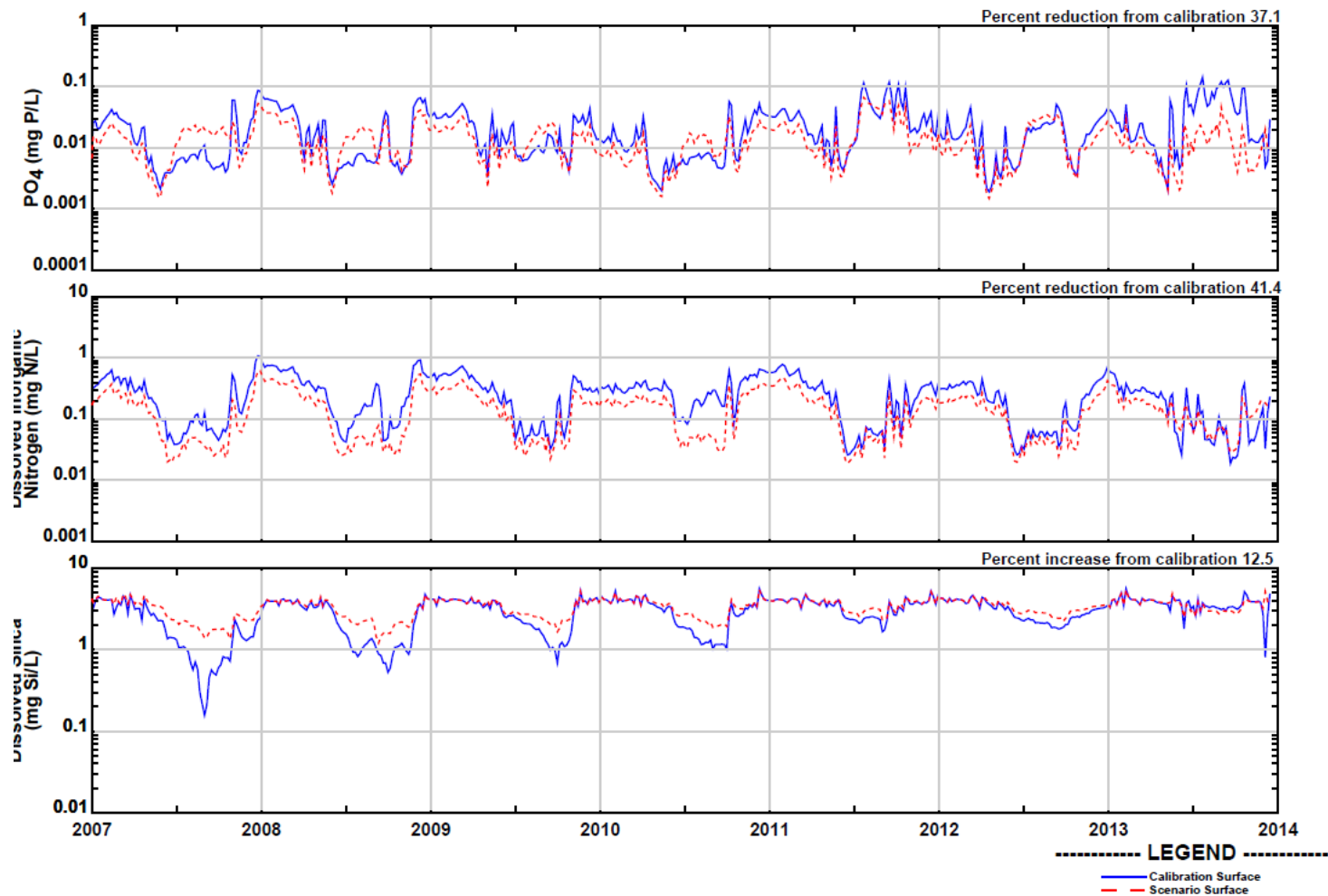


Figure 4-5b. James River 2010 TMDL Scenario results for station TF5.5

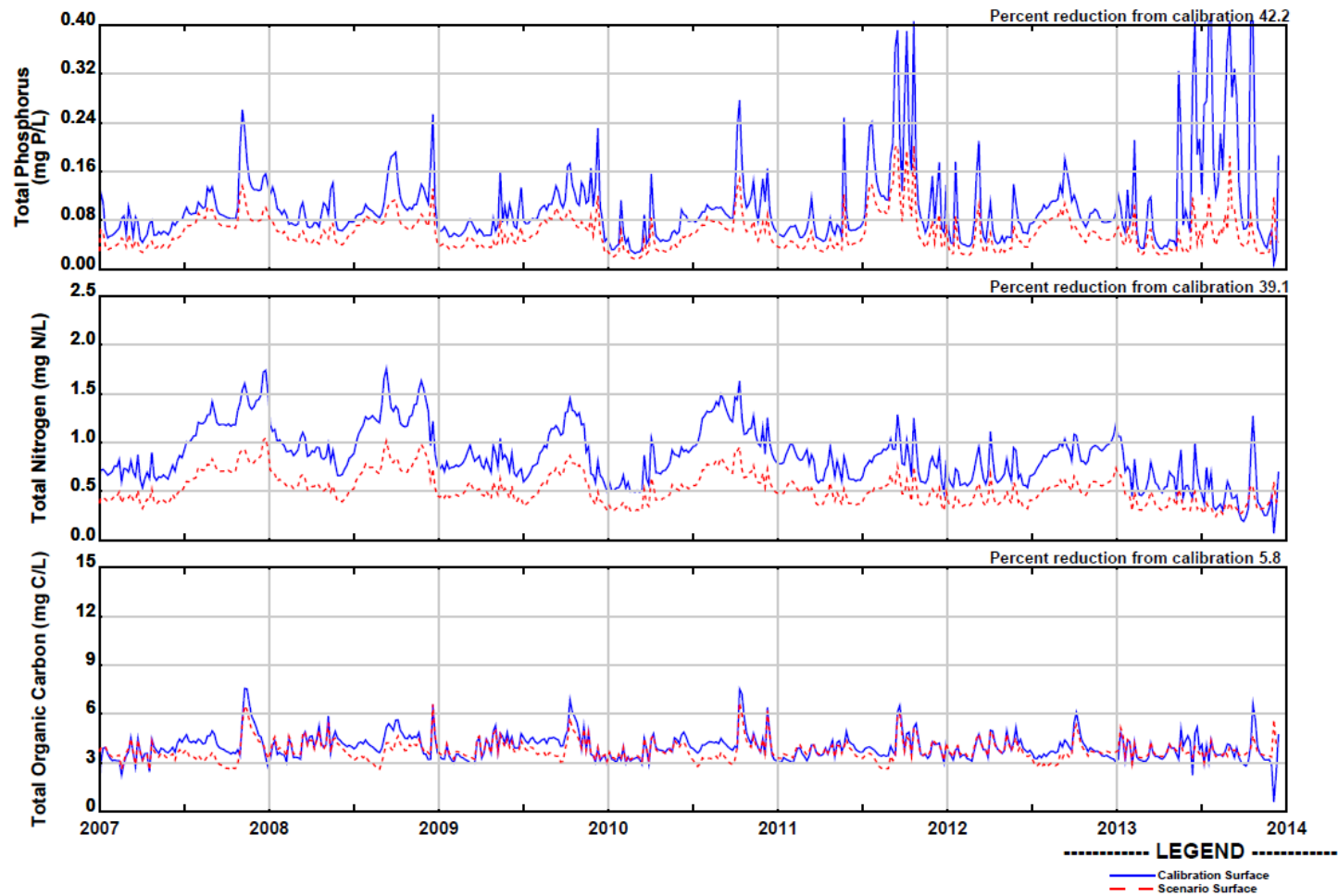


Figure 4-5c. James River 2010 TMDL Scenario results for station TF5.5

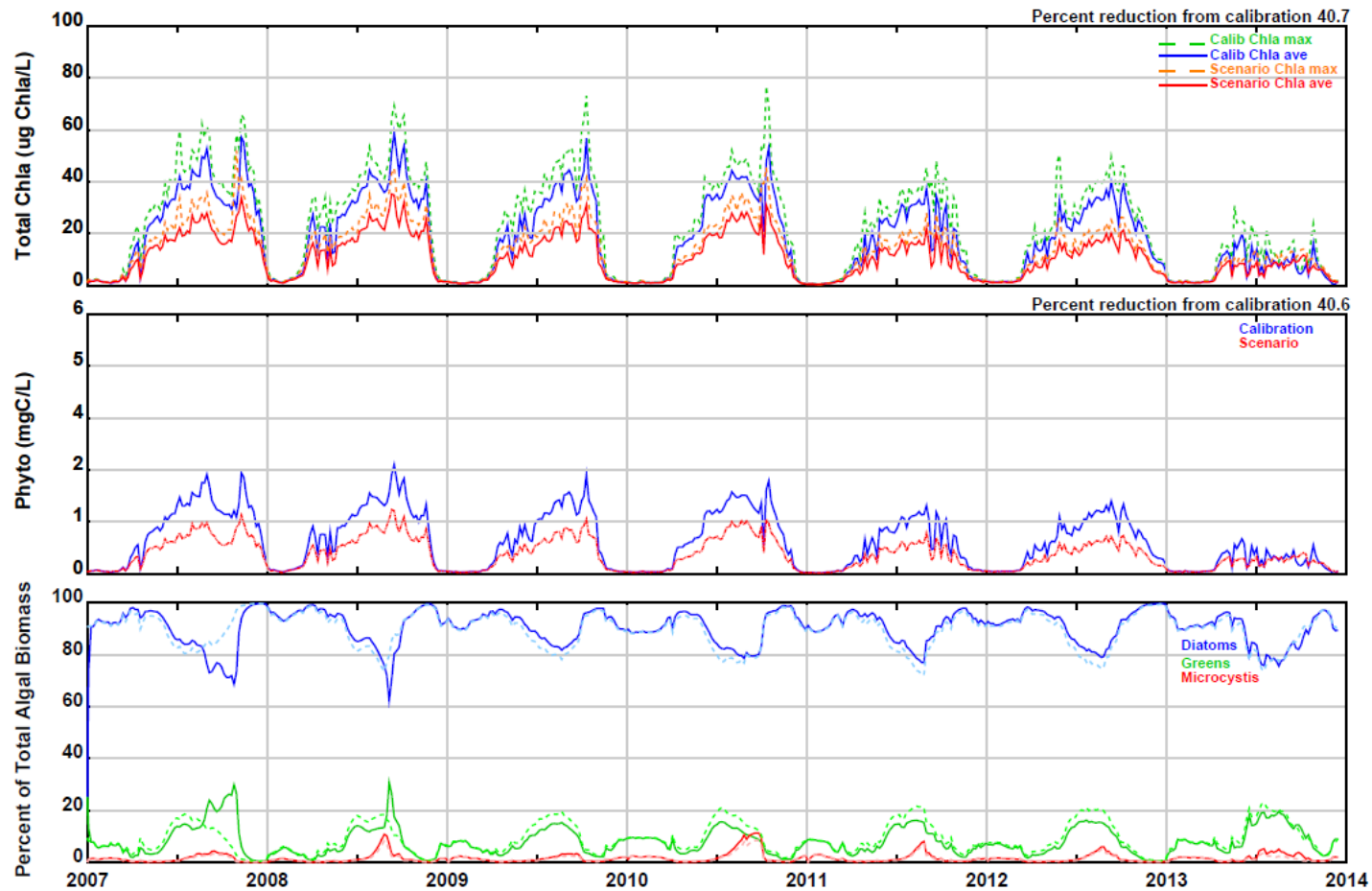


Figure 4-5d. James River 2010 TMDL Scenario results for station TF5.5

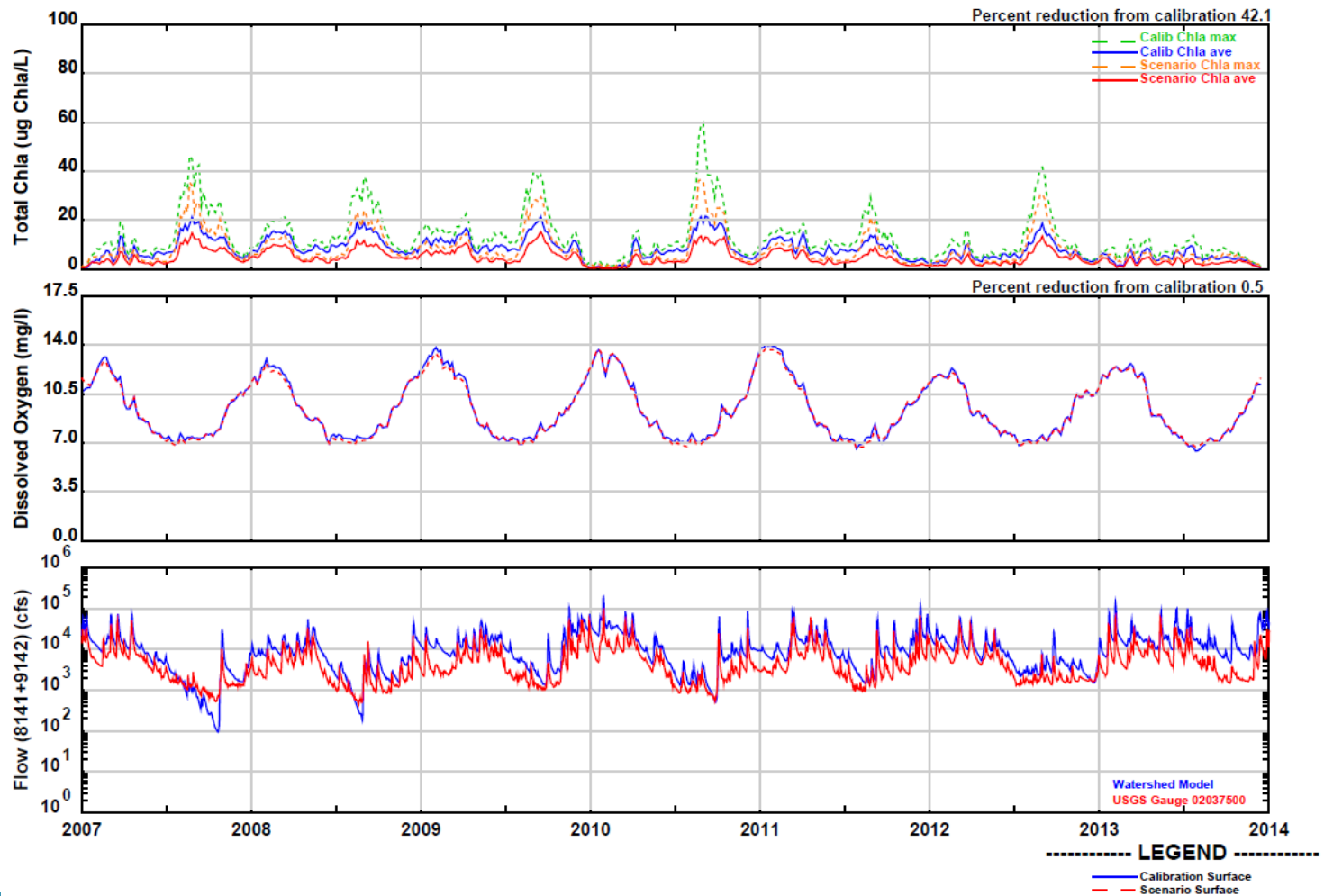


Figure 4-10a. James River 2010 TMDL Scenario results for station LE5.2

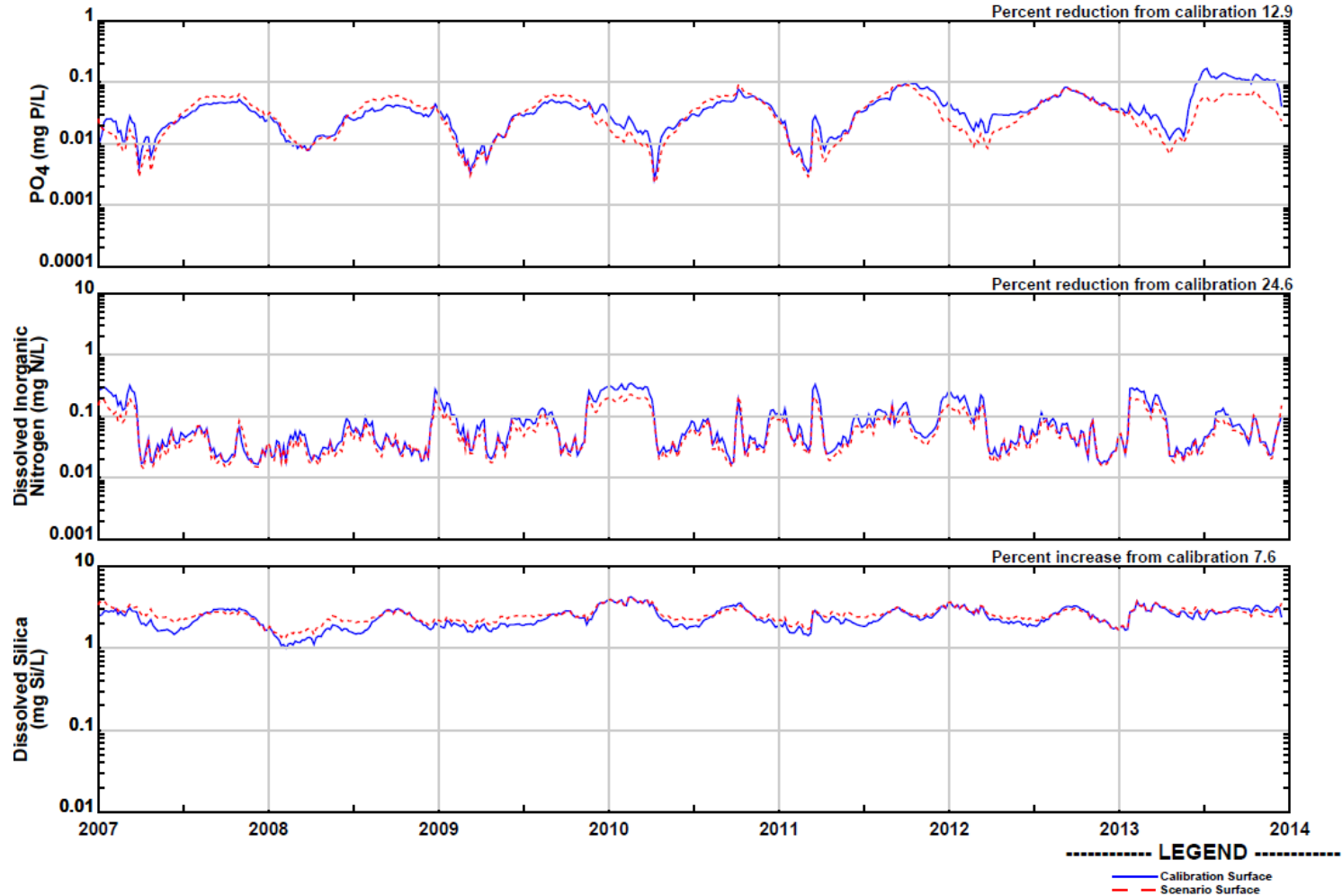


Figure 4-10b. James River 2010 TMDL Scenario results for station LE5.2

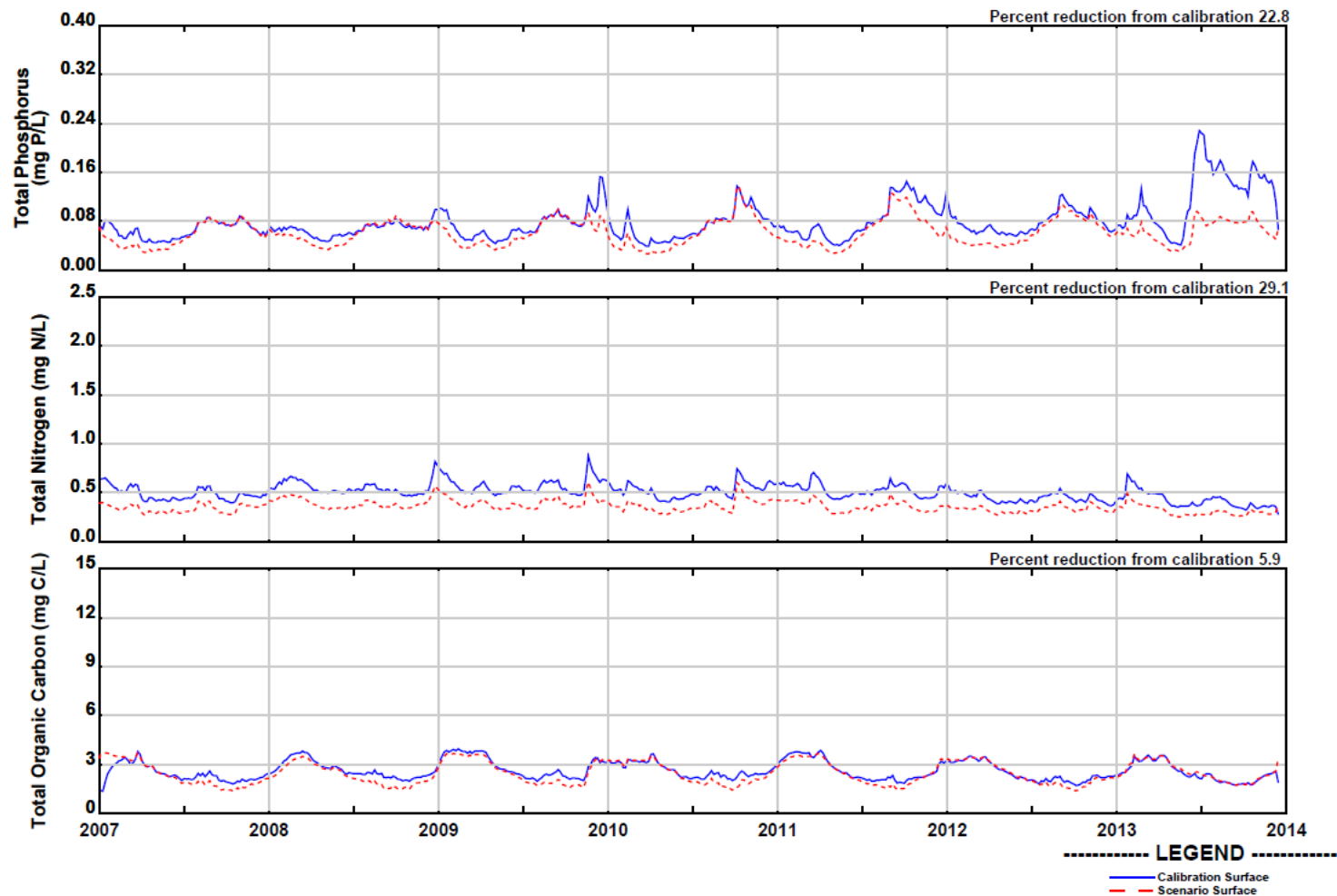


Figure 4-10c. James River 2010 TMDL Scenario results for station LE5.2

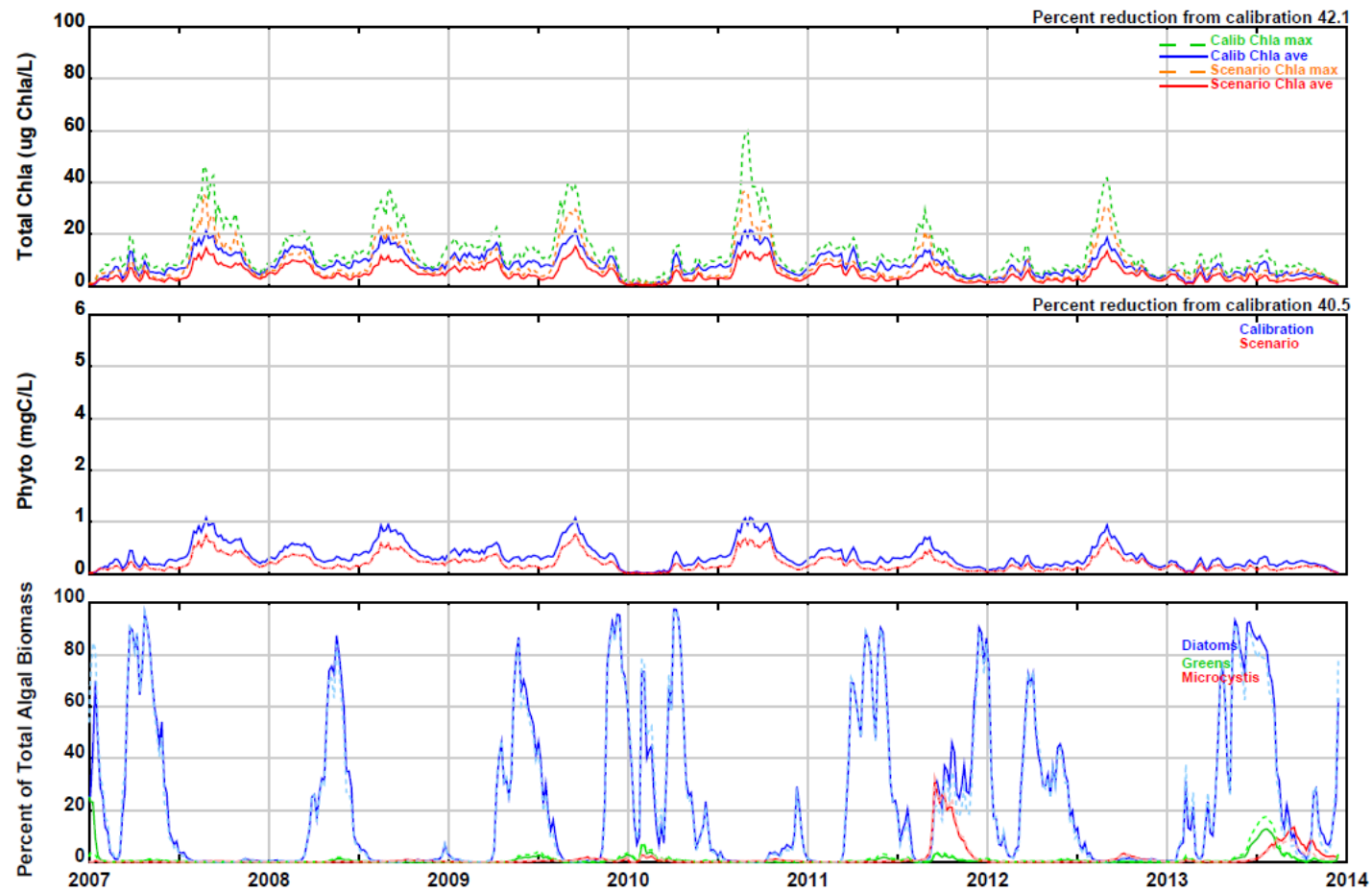


Figure 4-10d. James River 2010 TMDL Scenario results for station LE5.2

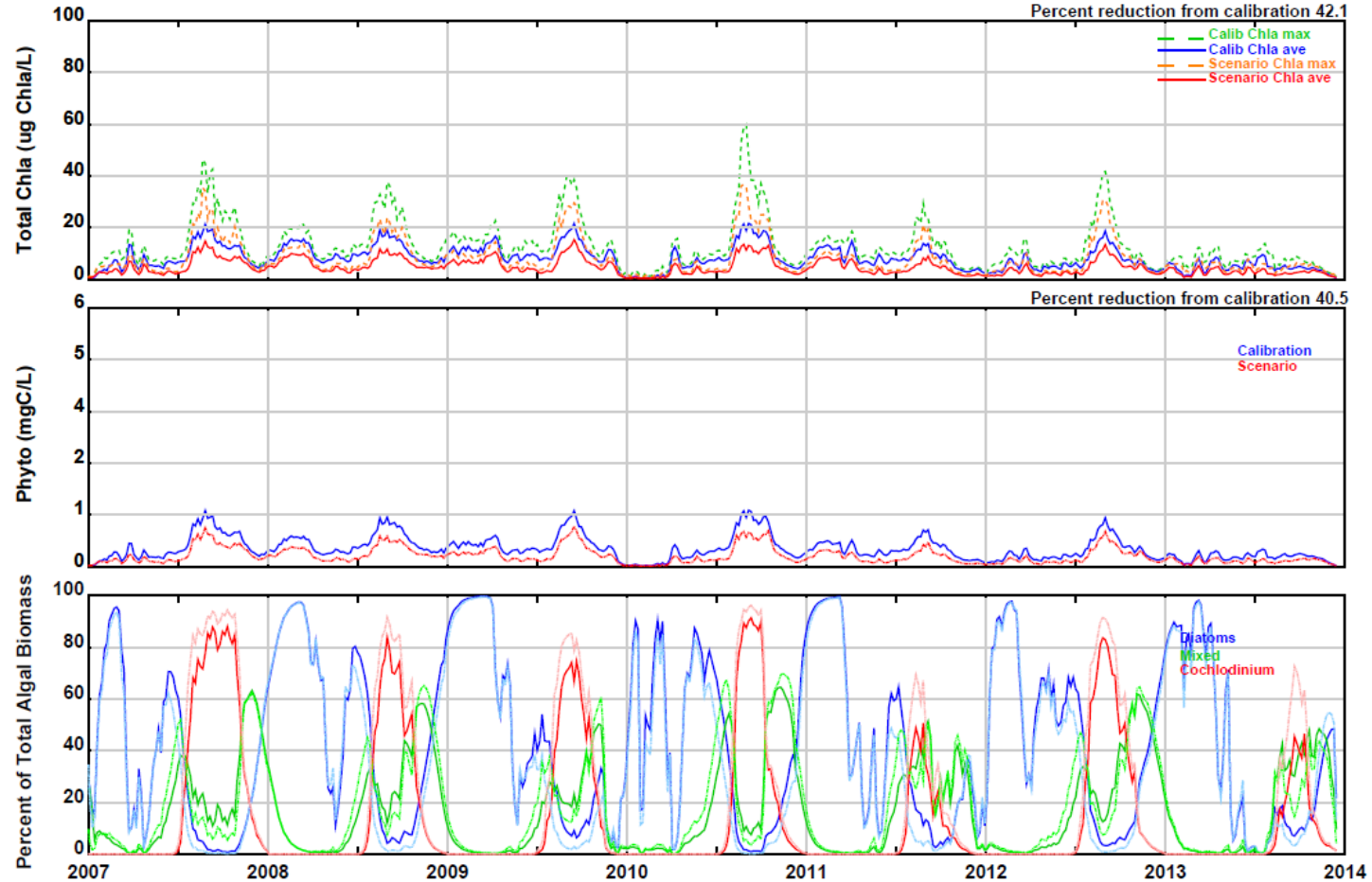


Figure 4-10e. James River 2010 TMDL Scenario results for station LE5.2

Summary of Changes in Chl-a Resulting from the Various Scenarios

Station	2010 TMDL	DO Attainment	2009 Progress TMDL	HRSD WWTP
TF5.2	1.1 ⁽¹⁾	0.6 ⁽¹⁾	1.3 ⁽¹⁾	2.2 ⁽¹⁾
TF5.2A	9.8	10.4	4.8	10.9 ⁽¹⁾
TF5.3	20.9	19.4	15.4	5.8 ⁽¹⁾
TF5.4	41.8	34.5	32.4	0.0
TF5.5	40.7	35.0	31.7	0.6
TF5.5A	45.3	37.7	35.5	0.2
TF5.6	50.8	42.3	40.8	0.9
RET5.2	51.3	40.9	41.5	0.6 ⁽¹⁾
LE5.1	49.0	38.8	39.9	3.5 ⁽¹⁾
LE5.2	42.1	33.8	34.4	1.1 ⁽¹⁾
LE5.3	34.2	27.3	27.8	0.9
LE5.4	28.6	22.8	23.1	1.7
LE5.5W	24.7	19.6	19.7	1.6
LE5.6	31.1	24.8	25.2	4.1
LFB01	29.2	23.2	23.8	9.6

Attainment with Current James River Estuary Chl-a Standards

- Provided model scenario outputs (daily-averaged chl-a) to the USEPA CBPO and they assessed attainment for spring and summer seasons
- Summarized with EPA “stop light” format

Spring Period

Segment	Assessment Period	Calibration	2010 TMDL	DO Attainment	2009 Progress	HRSD WWTP
JMSTFU	2007-2009	0.0	0.0	0.0	0.0	0.0
JMSTFU	2008-2010	0.0	0.0	0.0	0.0	0.0
JMSTFU	2009-2011	0.0	0.0	0.0	0.0	0.0
JMSTFU	2010-2012	0.94	0.0	0.0	0.0	0.06
JMSTFU	2011-2013	0.94	0.0	0.0	0.0	0.06
JMSTFL	2007-2009	0.0	0.0	0.0	0.0	0.0
JMSTFL	2008-2010	0.0	0.0	0.0	0.0	0.0
JMSTFL	2009-2011	0.0	0.0	0.0	0.0	0.0
JMSTFL	2010-2012	16.87	2.71	2.62	10.65	17.21
JMSTFL	2011-2013	16.87	2.71	2.62	10.65	17.21
JMSOH	2007-2009	22.64	21.77	21.77	21.77	22.74
JMSOH	2008-2010	22.64	21.77	21.77	21.77	22.74
JMSOH	2009-2011	21.77	21.77	21.77	21.77	21.77
JMSOH	2010-2012	11.34	0.0	0.0	0.0	11.02
JMSOH	2011-2013	25.36	0.0	0.0	0.0	27.60
JMSMH	2007-2009	9.12	0.0	0.0	3.51	9.03
JMSMH	2008-2010	9.12	0.0	0.0	3.51	9.03
JMSMH	2009-2011	9.12	0.0	0.0	3.51	9.03
JMSMH	2010-2012	0.0	0.0	0.0	0.0	0.0
JMSMH	2011-2013	11.48	8.57	8.85	9.30	12.85
JMSPH	2007-2009	13.83	0.0	0.0	0.0	8.92
JMSPH	2008-2010	0.0	0.0	0.0	0.0	0.0
JMSPH	2009-2011	0.0	0.0	0.0	0.0	0.0
JMSPH	2010-2012	0.0	0.0	0.0	0.0	0.0
JMSPH	2011-2013	0.0	0.0	0.0	0.0	0.0

Summer Period

Segment	Assessment Period	Calibration	2010 TMDL	DO Attainment	2009 Progress	HRSD WWTP
JMSTFU	2007-2009	39.81	40.08	40.35	40.22	41.04
JMSTFU	2008-2010	40.90	39.67	38.72	40.08	41.04
JMSTFU	2009-2011	55.62	46.88	48.24	49.61	55.76
JMSTFU	2010-2012	35.95	23.15	24.51	25.88	35.81
JMSTFU	2011-2013	15.37	4.22	6.51	6.51	15.10
JMSTFL	2007-2009	30.30	6.18	7.45	7.55	29.97
JMSTFL	2008-2010	30.63	7.15	12.06	12.36	30.27
JMSTFL	2009-2011	49.76	22.62	29.26	29.33	49.49
JMSTFL	2010-2012	54.40	31.70	38.24	38.31	53.96
JMSTFL	2011-2013	59.37	25.87	28.24	28.00	45.49
JMSOH	2007-2009	0.0	0.0	0.0	0.0	0.0
JMSOH	2008-2010	0.0	0.0	0.0	0.0	0.0
JMSOH	2009-2011	0.0	0.0	0.0	0.0	0.0
JMSOH	2010-2012	0.0	0.0	0.0	0.0	0.0
JMSOH	2011-2013	0.0	0.0	0.0	0.0	0.0
JMSMH	2007-2009	28.22	21.77	21.86	21.77	25.12
JMSMH	2008-2010	41.26	33.59	34.69	32.41	40.34
JMSMH	2009-2011	41.26	33.59	34.69	32.41	40.34
JMSMH	2010-2012	28.85	12.53	15.99	18.54	28.30
JMSMH	2011-2013	26.02	17.46	19.64	7.94	26.48
JMSPH	2007-2009	70.92	70.92	70.92	46.09	70.92
JMSPH	2008-2010	59.94	46.09	46.09	46.09	56.53
JMSPH	2009-2011	59.94	21.77	21.77	21.77	56.53
JMSPH	2010-2012	59.94	13.08	21.77	0.0	56.53
JMSPH	2011-2013	70.92	37.38	46.09	0.0	70.92